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SOURCE EVALUATIONS ARE DEFINITIVE. APPRAISAL OF CONTENT IS TENTATIVE.

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1. Prior to the nationalization of the Polish electrotechnical industry its production was far more diversified, particularly with reference to electric motors and their accessories, starter motors, automatic switches, and resistors. Since nationalization, official policy has encouraged mass production of comparatively few standard items, necessitating the transfer or dissolution of certain auxiliary departments of electrotechnical factories. An example of the harmful results of this policy is the M-8 works (formerly owned by George Schwabe) in Bielsko, which was reconditioned for standardized mass production of asynchronous motors of 0.37 - 30 kw., entailing the discontinuation of spinning machinery for export, and electric motors and air compressors for the German "Knorr" railway brakes.
2. Conversely, this policy of specialization has as yet not been fully implemented. Thus, the "K" works Kabel-Praszow, Krakowskie Zaklady Wytworcze Materjalow Elektrotechnicznych, manufactures cables and heavy electric installations as well as bakelite powder, although the latter falls within the competence of the organic branch of the Ministry of Chemical Industry.
3. Individual plants are normally designated by numbers preceded by a capital letter which indicates their basic branch of production:
 - a. "A" indicates plants manufacturing electric tools and instruments.
 - b. "M" designates plants producing electric machinery, particularly of the revolving type (generators and motors), transformers, mercury-vapor rectifiers, and electric furnaces. Plants manufacturing insulating materials from organic compounds also fall within this group, while those producing electrotechnical ceramics, such as Brzezinka in Myslowice, and Elektro-Procelana-Boguchwala in Rzeszow, belong to the "A" group.
 - c. "T" indicates plants manufacturing couplings and telecommunications equipment, such as condensers for couplings and high-frequency apparatus.

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- d. "K" indicates plants producing cables and wire, as well as accumulators.
- e. "L" indicates plants manufacturing bulbs and fluorescent tubes, including the Mewa works in Bielsko which supplies Edison lamps for the entire country, and the Rosa Luxemburg factory in Warsaw producing tungsten wire and filaments for vacuum tubes.

Administrative Control

4. Administrative control over the electrotechnical industry in its various aspects is exercised by special departments in the Ministries of Machine Industry, Power Industry, and Industrial Construction, the first-mentioned of these constituting the over-all authority for the entire branch. Until recently the above-mentioned light bulb factories were subordinate to the Ministry of Machine Industry, reportedly because of the military uses of their products. Other plants engaged in the manufacture of accessories or installations come under the control of the Ministry of Industrial Building and the Ministry of Power Industry. In the former category are the Chief Directorate of Electric Installations (Centralny Zarząd **Przedsiębiorstw Elektrycznych**), and a number of factories in Warsaw, Krakow, Stalinogrod (Katowice), Wroclaw (Breslau), Bydgoszcz, and Gdansk (Danzig). Subordinate to the last-mentioned ministry are such works as Elektrobudowa, Elektropomiar, Energobudowa, and Elektroprojekt, as well as plants manufacturing spare parts and accessories like the large Mokolow works, situated 7 km from Stalinogrod. The highest authority in all questions pertaining to the industry as a whole is Deputy Minister Kopicnsky, who has little professional qualification for this post, and Director General Rubinsztajn.

Labor Statistics and Technical Standard

5. One-sixth of Poland's entire technical labor force is engaged in the electro-technical industry. In the absence of specified statistics on the subject, certain conclusions can be drawn from available data on the membership of NOT (Naczelna Organizacja Techniczna), the comprehensive organization for 17 professional associations of engineers and technicians:
 - a. Total number of members - 169,000
 - b. Engineers - 34,000
 - c. Technicians - 85,000
 - d. Foremen and production experts - 50,000
6. Prior to World War II the industry was based on slightly more than a dozen comparatively small factories, employing an average of a few hundred workers. Foreign investments had been made in these factories and the major part of production was carried out under foreign patent licenses. Under the Communist regime a number of new enterprises in this field were set up, including in the electric machines and instruments branch, the plant for the manufacture of heavy electric equipment in Wroclaw (Fabryka Wielkich Maszyn Elektrycznych), the factory for small electric motors in Tarnow, the high-tension instruments

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factory in Miedzylesie near Warsaw, the low-tension instruments factories in Torun and Bielsko (the latter with a staff of 1,500), the electric appliance factories in Kozuchow and Wierbka near Zielona Gora (Gruenberg), and the factory for resistance heating apparatus in Swiebodzin near Wroclaw.

In an effort to convert the industry to mass production, automatic or semi-automatic devices have been installed in the following factories:

- a. A-16 in Brzezinka¹ - soldering irons.
- b. A-15 in Czechowice² - semi-automatic bending device for contractor springs.
- c. A-9 in Kostuchna (N50-I2, E 19-00) - varnishing of reinforced metal pipes.

The following plants have converted to mass production to a considerable degree:

- a. A-2 in Lodz, which produces low-voltage switches, and supplies most of Poland's requirements in dry contactors up to 100 amperes.
- b. A-6 in Swidnica³, which produces consumption meters.
- c. A-18 in Zabkowice Slaskie (Frankenstein), which manufactures precision instruments, automatic microswitches up to 25 amperes and couplings up to 40 amperes.
- d. M-7 in Tarnow, which produces asynchronous motors of 7 kwh. The entire production of the plant, the equipment of which includes the only installation for motor casing production in Poland, is exported to the USSR.

Faulty organization has impeded the conversion to mass production. An additional obstacle is the absence of certain high-quality raw materials, such as ceramics for large insulators for 220 kv frequencies. The Zoflowka Electro-technical Factory in Walbrzych (Waldenburg), for example, exports high-tension insulators at nominal prices to the Italian firm of Gallileo which, in turn sells the Polish plant high-frequency switches of the same materials but at inflated rates. Also in short supply are high-resistance pipes, and thermo-plastic and thermoactive materials of good quality. Varnishes, oil paint, siliceous plastics, and other high-grade insulators, such as the asbestos compound BCD, glass wool, etc., are virtually **unobtainable**. Similarly unavailable is transformer and dynamo sheeting with low loss rates, which Poland only produces in the category of 1.07 mm for 2-3 w; the Elokisal insulation system of electrolyte for aluminium anode cells is unknown. Finally, there is a shortage of high-grade wire, preventing the manufacture of certain kinds of machinery for export, and necessitating the import of resistors and windings.

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Plants Manufacturing Electric Tools and Instruments

10. A-1 produces electric components for motor vehicles and transformers for measuring instruments (sic). The enterprise, which is situated at No. 1 Katuszynska Street, Warsaw, employs 1,200 workers. The chief engineer is Kwal (fnu).
11. A-2, located in Lodz, manufactures plugs, push buttons, and limit switches. The enterprise, formerly known as Siemens Schalter Werke, has a labor force of about 500.
12. A-3 (formerly Era Electric Equipment Factory), situated in Wlochy near Warsaw, produces measuring instruments and control boards (volt and ampere) for industrial enterprises and laboratories. The plant, which employs 600, supplies the entire requirements of ammeters of the Zeran Automobile Works, as well as instruments for jet aircraft. The chief engineer is Lebson (fnu), and one of its best designers is Engineer Walter (fnu).
13. A-6 in Swidnica, which has a labor force of 800, manufactures general purpose consumption meters as well as special types for knitting machines, relays, and advertising installations.
14. A-7, a modern plant in Torun, produces measuring benches, switchboards, crane and coal mining equipment, a considerable part of which is destined for export. The enterprise has a staff of 8,000 workers; its chief engineer is Prof. Zbigniew Wojnarowski.
15. A-8 in Bielsko produces various types of DC apparatus crane equipment, marine switches for the use of the Polish Navy, low-voltage switches for high-ampere currents, high-velocity switches for electrolysis, and high-voltage fuses. Its production also includes electric installations for submarines and other naval vessels, as well as for coastal power stations, DC switches, and switches for electric trolleys and locomotives. The plant, which employs 1,200 workers, is headed by politically reliable people lacking professional qualifications, among them Chief Engineer Pierzchala (fnu), and two technicians promoted to the level of engineers, Magiera (fnu), and Przybylo (fnu).
16. A-10 in Miedzylesie near Warsaw, produces switches, high-tension plugs from 30-110,000 w, and similar items. Because of faulty organization this enterprise is continuously lagging behind its production plan and tries to compensate by manufacturing equipment outside its proper field of activity, such as polishing and grinding machines.
17. A-13 in Zabkowice Slaskie, which produces contactors, has a staff of about 200 workers.
18. A-17 in Swiebodzice (Freiburg), with a staff of 800 employees, manufactures electric accessories for motor cars, particularly for tracked and other military vehicles.
19. A-18 in Zabkowice Slaskie, produces contacts and microswitches, and employs about 120 workers.

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20. A-21 in Zielona Gora manufactures milliammeters.
21. The Central Electrotechnical Institute, the supreme scientific authority in this field, is situated near A-10 in Miedzylesie. The institute, headed by Dr. Szwarc (fnu) and his assistant Sodni (fnu), comprises research departments for: domestic electrical appliances (stoves, irons, refrigerators, washing machines, etc.) under the charge of Engineer Mielewski (fnu); industrial furnaces; electric machines; high-tension apparatus; telecommunications; cables and wires (under Prof. Bladewski); and insulation materials. The latter department, located in Gliwice (Gleiwitz), is a quasi-independent institution, headed by Prof. Skowronski (fnu) and Sizinski (fnu). The staff of the institute, composed of high school professors from throughout the country, amounts to approximately 400, and includes the expert Janusz Lech-Jakubowski. The financial outlay of the institute is covered from the budgets of the Polish Academy of Sciences and the Ministries of Machine Industry, Industrial Construction, and Power Industry. The institution has recently also become engaged in nuclear research.
22. Parallel to the institution is an Institute of Energetics, which works out plans for the construction of high-tension grids and is in charge of all questions concerning the establishment of new power plants. It comprises departments for hydroelectric and thermal power stations, high-tension equipment, and others. The institute, founded in 1955, is located with the Ministry of Power Industry on Mysia Street, Warsaw. Its chief designer is Engineer Lesiowski (fnu). Its expenditure is covered from the budget of the ministry, one of whose officials, Gutherc (fnu), is personally in charge of all affairs pertaining to the institute's finances.

Plants Manufacturing Electrical Machines

23. M-1, (formerly Brown Boveri Rohn Works), in Zychlin near Lowicz (N 52-07, E 19-56), manufactures large transformers and electric motors, 500-ampere welding apparatus. It is also engaged in the electrification of the Warsaw railway junction. Its 1,800 employees work under poor conditions; wages are low and a considerable part of the staff is suffering from tuberculosis. The plant manager is Ekert (fnu).
24. M-2 in Zichyn⁴ manufactures electric motors of various types and sizes, particularly for hoisting machinery. The enterprise maintains its prewar tradition of good workmanship, and a number of its 1,200 employees have been on the staff for many years. The manager is Czuma (fnu).
25. M-3 and M-10 both manufacture transformers. While the first, which is located in Lodz, does not enjoy a particularly good reputation in the industry because of its outdated equipment, M-10, situated in Mikolow, 7 km from Stalinogrod, is known for its high-quality products, most of which are exported to China. The enterprise, which, specializes in transformers for mining machinery, employs 400 workers.

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26. M-5 in Wroclaw manufactures electric motors for rolling mills, for hoisting machinery used in mines, and for pumps. In addition it manufactures alternators for small turbines produced by the Elblag (Elbing) works. This plant, which was formerly known under the name of Famo Werke (Diesel), was almost entirely dismantled by the Soviets, and rebuilt according to Soviet specifications. Although large lathes and other equipment were purchased from Czechoslovakia and the USSR, and the original manager, Cyril Szulc, discharged because of inefficiency, the enterprise is still not operating satisfactorily. Its staff amounts to 1,000 workers.
27. M-7 in Tarnow is engaged in mass production of electric motors of up to 3 kw. The plant, which employs 1,500 workers, reportedly has an (annual ?) output of 120,000 motors, whose windings are imported from East Germany.
28. M-8 in Bielsko manufactures electric motors for tracked military vehicles. With regard to mechanical equipment the plant ranks first among the enterprises of the industry and has enjoyed an excellent reputation for many years. Following its nationalization, however, many of the veteran workers, most of whom were Czechs, were replaced by new personnel, and the quality of the products has considerably declined since. Dobrowolski (fnu) is the chief engineer.
29. M-12 in Swiebodzin and M-14 in Lodz manufacture electric molding furnaces, thermoelements, and electric drying apparatus.

Plants Manufacturing Cables and Wires

30. Plants in this category are situated in Czechowice, Krakow, Bydgoszcz, and Ozarow near Warsaw. Their products comprise copper wire for coils with silk, cotton, and enamel insulation. The Krakow plant manufactures bakelite, glass wool, and cables whose rubber sheathing is imported from East Germany, and which are destined for use in mines, industrial enterprises, and in the armed forces. Cables produced by the plants comprise general purpose and high-tension cables for up to 30 kw, as well as aluminum cables for locomotives. The battery works in Bielsko manufacture lead-plate accumulators, as well as nickel (Edison) accumulators used in miners' lamps.

Plants Manufacturing Telecommunications Equipment

31. Prior to World War II this branch of industry in Poland comprised two large plants employing some 2,500 workers each, six medium-sized factories with a staff of about 500 employees each, and approximately 100 workshops, each with an average staff of 75. The following lists production figures in this branch of industry for 1938 and 1955 (at the completion of the Six-Year Plan):

	<u>1938</u>	<u>1955</u>
a. Automatic telephone installations in towns	3,000	21,000
b. Telephones installed at subscribers'	1,500	24,000
c. Nonautomatic telephone installations typs CB and MB	10,000	56,000

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d. Interurban telephone lines	60	220
e. Telephone sets	145,000	140,000

32. Radio production includes the following types:

- a. 5 kw medium-wave set for telegraphic and voice communication.
- b. 10 kw short-wave set for telegraphic and voice communication.
- c. 10 kw ultra-short-wave set (FM).
- d. 100 kw ultra-short-wave set.
- e. 150 kw medium-wave set.

33. Radio production totalled 460,000 sets in 1955; the production plan for 1957-1958 includes the following types:

- a. Grade "B" set, AM-FM.
- b. Grade "A" set, AM and FM, with or without adapter.
- c. Grade "A" set, high-frequency set, AM and FM, with adapter, microphone and magnetophone, for public reception.
- d. Motor car receiver.
- e. Grade "C" set, universal, AM with induction regulator.
- f. Battery set for use with transformer, with range of two wave bands (?).
- g. Popular receiver.
- h. Portable set (in suitcase).

The Manufacture of Electronic Measuring Instruments

34. Production in this field comprises some 40 types of instruments, among them: measuring bridges, voltmeters and other measuring devices for light bulbs, meg'ohm meters, generator for telegraphic and voice transmission, oscillographs, cathode resistors, absorption-wavemeters, deformation (possibly deflection ?) measuring bridges, milivoltmeters for bulbs, microvoltmeters, quality measuring instruments (sic).

High-Frequency Furnaces

35. Production currently includes medium-temperature induction furnaces of 10-20 but 50-100 kw installations are planned for the future. Arc furnace production includes 1-10 kw types for bakelite processing; preparations for the manufacture of 20-50 kw furnaces are reportedly under way.

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Selenium Rectifiers

36. Selenium rectifiers are produced for the following purposes:
- Welding apparatus.
 - Telephones, one and three-phase types.
 - Battery charging installations, one-phase type .
 - Battery charging installations, three or four-phase types.
 - Galvanizing installations, three-phase types.

Enterprises for Electric Installations

37. Work in enterprises of this type is highly specialized comprising assembly and installation of 15 kw and 30 kw switchboards, encased high-tension switchboards, mobile (?) low-tension switchboards, industrial generating plants with one or two transformers for specific purposes for whole enterprise or particular production sections, generating plants with transformers for use on construction sites, special shielding for high-tension and low-tension generators in industrial plants, and installations for the changing of lighting circuits from AC to DC.

Production of New Types of Electric Equipment Under the Next Five-Year Plan

38. The next Five-Year Plan for the electrotechnical industry envisages an increase in the production of high-tension equipment, and greater diversification in the output of 15 kw and 110 kw switches with low oil consumption (?) for high-tension circuits, as well as of air switches for 110 kw with disconnection output of 4,000 mva (possibly specific torque coefficient). The production of 30 kw open-air switches of up to 600 amperes and interior switches of up to 4,000 amperes will also be emphasized. The plan foresees the beginning of manufacture of special purpose switchboards for high-tension circuits with VMG, fire-proof mining switchboards, and selector switchboards. In the field of low-tension equipment for hoisting and traction machinery the dominating tendency is toward production of fire-proof apparatus for use in mines, including switches of the types KWSO-40 and KWSO-200, transformers (type K2W0 - 3.5 KVA), centrifugal switches, and electric appliances for combine harvesters and mining machinery.

Imports

39. High-grade enamel insulated windings, copper for electrolysis and mining, paper, and mineral oil for insulation, polystyrenes, jute, cotton, natural silk, and other raw materials are imported.
40. In the field of light bulb manufacture, imports include finished bulbs, glass, special purpose and low-tension bulbs, tungsten, nickel, cobalt, and other metals with a high melting point.

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41. Imports of electrical machinery include commutator motors, particularly for the paper industry, installations for the operation of Ward Leonard controls, rectifier apparatus, and high-velocity switches for traction machinery. Ceramic contact materials and special purpose brushes are also imported.
42. Import of materials for resistors includes chrome-nickel and chrome-aluminum wires, iron wire (mainly Swedish Kanthal) and megaphyr (?) wire from the West German firm Meracus-Vakuumschmelze AG in Hanau.
43. Imported magnetic materials comprise cobalt, high-grade roasted metals, and cold-rolled sheeting with low electromagnetic losses (0.35 - 0.5 mm and 0.05 - 0.2 mm) for high-frequency installations.
44. As regards insulators, Poland lacks entirely and imports in large amounts: silicates and similar materials (varnishes, oils, rubber, glue, waterproofing materials), polysterine, polyfluorethylene, ceramic insulators, steatite, and other raw materials for the ceramic industry.

Exports

45. Poland exports sheathed, underground, and polyvinyl cables. Favorable conditions also reportedly exist for the export of Polish electrodes for metallurgical arc furnaces, SiC and Al_2O_3 . These materials are produced by a plant in Raciborz (Ratibor) (the former Siemens Plastik Werke), which is subordinate to the Ministry of Chemical Industry and employs about 2,500 workers. Export possibilities similarly exist for the export of electric installations of 500 kwh for the processing of bakelite and ceramic materials, either standard or tropical type, electric motors of 0.37 - 30 kwh, for 50 cycles AC, switches and starters for these motors, and various types of electric pumps.

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